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AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A thermoacoustic generator comprising:

a housing containing a working volume of gas with a pressure;

a thermoacoustic core supported in the housing and having a first heat exchanger and a second heat exchanger, the thermoacoustic core operable to introduce acoustical power into the housing thereby oscillating the pressure of the gas at a frequency; and

a piezoelectric alternator supported in the housing and having a face that is movable when acted on by acoustical power, the alternator further including a portion of piezoelectric material operable to produce electrical power when acted on by a stress, the portion of piezoelectric material being in mechanical communication with the movable face such that movement of the face stresses the portion of piezoelectric material so as to produce electrical power;

the thermoacoustic core, the gas and the alternator defining a resonating system with a resonating mass operable to resonate at the pressure oscillation frequency;

~~wherein the alternator has~~ having a moving mass that serves as a substantial portion of the resonating mass inside the housing such that the moving mass substantially reduces the pressure oscillation frequency of the resonating system as compared to a system without the moving mass;
~~thereby providing a pressure oscillation frequency in the housing substantially lower than for a similar system with a rigid member replacing the alternator.~~

2. (Original) The thermoacoustic generator according to claim 1, wherein the movable face of the alternator substantially blocks the passage of the gas.

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3. (Original) The thermoacoustic generator according to claim 2, wherein the housing has a side wall, the movable face comprising a first diaphragm with a perimeter seal substantially sealing the first diaphragm to the side wall of the housing.

4. (Previously Amended) The thermoacoustic generator according to claim 2, wherein the housing has a side wall, the movable face comprising a first piston with a perimeter seal substantially sealing the first piston to the side wall of the housing, the perimeter being selected from the group consisting of a roll sock, a bellows, and a clearance seal.

5. (Original) The thermoacoustic generator according to claim 3, further comprising a second diaphragm forming a second face of the alternator, the portion of piezoelectric material also being in mechanical communication with the second face and being disposed between the first and second diaphragms.

6. (Currently Amended) ~~The thermoacoustic generator according to claim 1, wherein~~

A thermoacoustic generator comprising:

a housing containing a working volume of gas with a pressure;

a thermoacoustic core supported in the housing and having a first heat exchanger and a second heat exchanger, the thermoacoustic core operable to introduce acoustical power into the housing thereby oscillating the pressure of the gas at a frequency; and

a piezoelectric alternator supported in the housing and having a face that is movable when acted on by acoustical power, the alternator further including a portion of piezoelectric material operable to produce electrical power when acted on by a stress, the portion of piezoelectric

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material being in mechanical communication with the movable face such that movement of the face stresses the portion of piezoelectric material so as to produce electrical power;

the piezoelectric alternator further ~~comprises~~ comprising:

a perimeter member including the portion of piezoelectric material, the perimeter member configured such that compression of the perimeter member causes compression of the portion of piezoelectric material, the perimeter member surrounding a central area;

a hub disposed in the central area, the hub being movable relative to the perimeter member along an axis, the hub being in mechanical communication with the movable face of the alternator; and

a plurality of spokes interconnecting the hub and the perimeter member such that relative movement of the hub along the axis compresses the perimeter member and thereby compresses the piezoelectric material;

wherein the alternator has a moving mass that serves as a substantial portion of a resonating mass inside the housing, thereby providing a pressure oscillation frequency in the housing substantially lower than for a similar system with a rigid member replacing the alternator.

7. (Previously Amended) The thermoacoustic generator according to claim 6, wherein the housing has a side wall, the alternator face comprising a first diaphragm having a perimeter seal sealing the first diaphragm to the side wall of the housing.

8. (Original) The thermoacoustic generator according to claim 7, further comprising a second diaphragm in mechanical communication with the hub, the second diaphragm having a

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perimeter seal sealing the diaphragm to the side wall of the housing, the perimeter member, hub, and spokes being disposed between the first and second diaphragms.

9. (Original) The thermoacoustic generator according to claim 6, wherein the perimeter member is generally ring-shaped.

10. (Original) The thermoacoustic generator according to claim 9, wherein the piezoelectric material portion of the ring-shaped perimeter member is substantially all of the ring-shaped perimeter member.

11. (Original) The thermoacoustic generator according to claim 6, wherein the perimeter member is generally polygonal shaped with intersection zones defined between adjacent generally straight segments, the portion of piezoelectric material comprising a portion of each of the straight segments.

12. (Original) The thermoacoustic generator according to claim 11, wherein the spokes are interconnected with the intersection zones of the polygonal-shaped perimeter member.

13. (Original) The thermoacoustic generator according to claim 11, wherein the generally straight segments of the perimeter member each further comprise a spring in series with the portion of piezoelectric material.

14. (Currently Amended) ~~The thermoacoustic generator according to claim 1, wherein~~

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A thermoacoustic generator comprising:a housing containing a working volume of gas with a pressure;a thermoacoustic core supported in the housing and having a first heat exchanger and a second heat exchanger, the thermoacoustic core operable to introduce acoustical power into the housing thereby oscillating the pressure of the gas at a frequency; anda piezoelectric alternator supported in the housing and having a face that is movable when acted on by acoustical power, the alternator further including a portion of piezoelectric material operable to produce electrical power when acted on by a stress, the portion of piezoelectric material being in mechanical communication with the movable face such that movement of the face stresses the portion of piezoelectric material so as to produce electrical power;the piezoelectric alternator further comprises:~~comprising;~~a perimeter support member generally defining an alternator plane, the member surrounding a central area;a hub disposed in the central area, the hub being movable relative to the perimeter support member along an axis generally perpendicular to the plane, the hub being in mechanical communication with the movable alternator face; andthe portion of piezoelectric material comprising a plurality of piezoelectric bimorph members each having an inner end in mechanical communication with the hub and an outer end supported by the perimeter support member such that relative movement of the hub along the axis flexes the bimorph members;wherein the alternator has a moving mass that serves as a substantial portion of a resonating mass inside the housing, thereby providing a pressure oscillation frequency in the housing substantially lower than for a similar system with a rigid member replacing the alternator.

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15. (Original) The thermoacoustic generator according to claim 14, wherein the bimorph members are generally wedge shaped such that a width of the members parallel to the alternator plane is narrower at the inner ends than at the outer ends.

16. (Original) The thermoacoustic generator according to claim 14, wherein the perimeter support member is generally circular.

17. (Previously Amended) The thermoacoustic generator according to claim 14, wherein the housing has a side wall, the alternator face comprising a first diaphragm having a perimeter seal sealing the first diaphragm to the side wall of the housing.

18. (Original) The thermoacoustic generator according to claim 17, further comprising a second diaphragm in mechanical communication with the hub, the second diaphragm having a perimeter seal sealing the diaphragm to the side wall of the housing, the perimeter support member, hub, and bimorph members being disposed between the first and second diaphragms.

19. (Original) The thermoacoustic generator according to claim 1, wherein the piezoelectric alternator further comprises at least one spring in series with the portion of piezoelectric material so as to alter the stiffness of the piezoelectric alternator.

20. (Currently Amended) ~~The thermoacoustic generator according to claim 1, wherein~~

A thermoacoustic generator comprising:

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a housing containing a working volume of gas with a pressure;

a thermoacoustic core supported in the housing and having a first heat exchanger and a second heat exchanger, the thermoacoustic core operable to introduce acoustical power into the housing thereby oscillating the pressure of the gas at a frequency; and

a piezoelectric alternator supported in the housing and having a face that is movable when acted on by acoustical power, the alternator further including a portion of piezoelectric material operable to produce electrical power when acted on by a stress, the portion of piezoelectric material being in mechanical communication with the movable face such that movement of the face stresses the portion of piezoelectric material so as to produce electrical power;

the piezoelectric alternator further ~~comprises~~ comprising a perimeter wall having a plurality of wall segments interconnected by springs, the portion of piezoelectric material comprising at least a portion of one of the wall segments, the movable face of the alternator comprising a surface of the wall segment;

wherein the alternator has a moving mass that serves as a substantial portion of a resonating mass inside the housing, thereby providing a pressure oscillation frequency in the housing substantially lower than for a similar system with a rigid member replacing the alternator.

21. (Original) The thermoacoustic generator according to claim 20, wherein the piezoelectric alternator further comprises an alternator body enclosing a portion of the working volume of gas, the perimeter wall forming part of the alternator body.

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22. (Original) The thermoacoustic generator according to claim 20, wherein the perimeter wall substantially separates the housing into first and second coaxial regions, the thermoacoustic core supported in one of the regions.

23. (Original) The thermoacoustic generator according to claim 22, further comprising a second thermoacoustic core supported in the other of the regions, the thermoacoustic cores being coaxially arranged.

24. (Original) The thermoacoustic generator according to claim 20, wherein the portion of piezoelectric material comprises substantially the entirety of all of the wall segments.

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40. (Currently Amended) A thermoacoustic generator, refrigerator or heat pump comprising:

a housing containing a working volume of gas with a pressure;

a thermoacoustic engine supported in the housing operable to introduce acoustical power into or to remove acoustical power from the housing; and

a piezoelectric transducer supported in the housing and having a face that is movable when acted on by acoustical power, the transducer further including a portion of piezoelectric material operable to convert between acoustical power, consisting of pressure and velocity, and electrical power, consisting of potential and current, the portion of piezoelectric

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material being in mechanical communication with the movable face such that movement of the face stresses the portion of piezoelectric material;

the thermoacoustic core, the gas and the transducer defining a resonating system with a resonating mass operable to resonate at the pressure oscillation frequency;

~~wherein the transducer has having a moving mass that serves as a substantial portion of the resonating mass inside the housing such that the moving mass substantially reduces the pressure oscillation frequency of the resonating system [as compared to a system without the moving mas], thereby providing a pressure oscillation frequency in the housing substantially lower than for a similar system with a rigid member replacing the transducer.~~

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